SELF-VENTILATING SHOE ASSEMBLY

Technical Field and Background of the Invention

[0001] This invention relates to a self-ventilating shoe assembly. The invention is applicable in footwear designed for running, sports, hiking, walking, and other related activities. The invention operates to repeatedly ventilate the interior of the shoe assembly, thereby creating a comfortable, healthy, and dry environment for the foot of the wearer. In further applications, the invention may be designed especially for construction workers, landscapers, and others requiring special footwear in order to safely and effectively perform their jobs.

[0002] One primary object of the invention is to reduce the amount of sweat that collects in the shoe during wear. This sweat promotes bacteria growth, and results in conditions ranging from relatively minor foot odor to more serious fungal infections, including painful athlete's foot.

[0003] Almost 70% of the population will be affected by athlete's foot at some time in their lives. In most cases, this condition can be cured with over-the-counter antifungal powder and basic good hygiene. If not treated properly and promptly, the infection can be very stubborn. Even when treated with antifungal drugs, the infection may take several weeks to disappear. As a means of preventing athlete's foot, physicians recommend wearing shoes that breathe. In addition, to control the bacteria population on the feet, it is also recommend that shoes be allowed to air out for at least 24 hours before wearing them again.

Summary of Invention

[0004] Therefore, it is an object of the invention to provide a self-ventilating shoe assembly which reduces foot odor and the incidence of fungal infections.

[0005] It is another object of the invention to provide a self-ventilating shoe assembly which maintains a comfortable, healthy, and dry environment for the foot of the wearer.

[0006] It is another object of the invention to provide a self-ventilating shoe assembly is relatively inexpensive to manufacture.

[0007] It is another object of the invention to provide a self-ventilating shoe assembly which can be safely worn everyday without increased risk of fungal infection.

[0008] These and other objects of the present invention are achieved in the preferred embodiments disclosed below by providing a self-ventilating shoe assembly. The shoe assembly includes an upper, an outsole attached to the upper, and an insole located between the upper and the outsole. A resilient ventilation body is located between the outsole and the insole, and has an intake communicating with an exterior of the shoe assembly and an exhaust communicating with an interior of the shoe assembly. Upon application of pressure against the resilient body, air is discharged outwardly through the exhaust to the interior of the shoe assembly, thereby ventilating the shoe assembly. Upon release of pressure from the resilient body, air is drawn inwardly from outside of the shoe assembly through the intake as the body expands to its original form.

[0009] According to another preferred embodiment, the intake includes a one-way valve operating to control passage of air inwardly and outwardly through the intake.

[0010] According to another preferred embodiment, the exhaust includes a one-way valve operating to control passage of air inwardly and outwardly through the exhaust.

[0011] According to another preferred embodiment, the ventilation body includes a plurality of exhausts adapted for ventilating the interior of the shoe assembly.

[0012] According to another preferred embodiment, the ventilation body has a plurality of bellows.

[0013] According to another preferred embodiment, the ventilation body includes visco-elastic foam.

[0014] According to another preferred embodiment, the ventilation body includes a compression spring.

[0015] According to another preferred embodiment, a toe vent communicates with the ventilation body, and is adapted for discharging air beneath the toes of a wearer.

[0016] In another preferred embodiment, the invention is a self-ventilating shoe assembly having an upper, an outsole attached to the upper, and an insole located between the upper and the outsole. First and second resilient ventilation bodies are located between the outsole and the insole, and in respective heel and ball regions of the shoe assembly. Each ventilation body has an intake communicating with an exterior of the shoe assembly and an exhaust communicating with an interior of the shoe assembly. Upon application of pressure against the resilient body, air is discharged outwardly through the exhaust to the interior of the shoe assembly, thereby ventilating the shoe assembly. Upon release of pressure from the resilient body, air is drawn inwardly from outside of the shoe assembly through the intake as the body expands to its original form.

[0017] In yet another preferred embodiment, the invention is a method for ventilating a shoe assembly having an upper, an outsole attached to the upper, and an insole located between the outsole and the upper. The method includes the steps of locating a resilient

ventilation body between the outsole and the insole of the shoe assembly. The ventilation body has an intake communicating with an exterior of the shoe assembly and an exhaust communicating with an interior of the shoe assembly. The ventilation body is compressed to discharge air outwardly through the exhaust to the interior of the shoe assembly, thereby ventilating the shoe assembly.

[0018] According to another preferred embodiment, the method includes releasing pressure from the resilient body, whereby air is drawn inwardly from outside of the shoe assembly through the intake as the body expands to its original form.

[0019] According to another preferred embodiment, the method includes discharging air through the exhaust to a ball and toe region of the shoe assembly.

[0020] According to another preferred embodiment, the method includes discharging air through the exhaust to a heel region of the shoe assembly.

Brief Description of the Drawings

[0021] Some of the objects of the invention have been set forth above. Other objects and advantages of the invention will appear as the description proceeds when taken in conjunction with the following drawings, in which:

[0022] Figure 1 is perspective view of a self-ventilating shoe assembly according to one preferred embodiment of the present invention, and showing portions of the insole torn away to better illustrate the underlying ventilation bodies;

[0023] Figure 2 is a fragmentary cross-sectional view of the shoe assembly with both ventilation bodies in a normal expanded state;

[0024] Figures 3, 4, 5, and 6 are sequential views illustrating operation of the shoe assembly;

[0025] Figure 7 is a perspective view of a self-ventilating shoe assembly according to a second preferred embodiment of the present invention;

[0026] Figure 8 is perspective view of a self-ventilating shoe assembly according to a third preferred embodiment of the present invention;

[0027] Figure 9 is an enlarged, fragmentary, cross-sectional view of a toe portion of the shoe assembly shown in Figure 8; and

[0028] Figures 10, 11, and 12 are cross-sectional views showing various ventilation bodies applicable for use in the present shoe assembly.

Description of the Preferred Embodiment and Best Mode

[0029] Referring now specifically to the drawings, a self-ventilating shoe assembly according to the present invention is illustrated in Figure 1, and shown generally at reference numeral 10. The shoe assembly 10 may be manufactured in a variety of constructions including a conventional sneaker or high top design for various sport activities, such as running, basketball, soccer, and the like. In other applications, the shoe assembly 10 is especially designed for workers in the construction and landscaping industries, or may be custom designed for certain medical conditions.

[0030] As best shown in Figures 1 and 2, the shoe assembly 10 includes an upper 11, an outsole 12 attached to the upper 11, and an insole 14 located between the upper 11 and the outsole 12. The upper 11 is formed in a conventional manner using a breathable leather, nylon or canvas material. The upper 11 is preferably lined with a moisture wicking fabric (not shown) adapted for moving moisture away from the foot. The outsole 12 is formed of an injection-molded rubber or polyurethane, and is cemented directly to the upper 11 using, for example, a toluene based solvent. The insole 14

comprises a relatively thin and soft, air-permeable foam padding. For added stiffness and support, a perforated PVC backing (not shown) may be attached to the insole padding.

[0031] First and second resilient ventilation bodies 16 and 17 are located between the outsole 12 and the insole 14, and within respective cutouts formed in a polyurethane midsole 18. The ventilation bodies 16, 17 reside in the heel and ball regions of the shoe assembly 10, and include respective tubular air intakes 21 and 22, and a number of strategically arranged air exhaust ports 23 and 24. The tubular intakes 21, 22 extends outwardly from the ventilation bodies 16, 17 through the midsole 18 and upwardly along the back of the heel to an exterior of the shoe assembly 10. Respective free ends of the intakes 21, 22 communicate with the exterior of the shoe assembly 10 a safe distance from any ground water, dirt or debris which may be encountered during normal wear. Standard one-way valves 21A, 22A are formed adjacent the mouths of the intakes 21, 22 to regulate and control air flow. The intake valves 21A, 22A allow one-way air flow inwardly from outside of the shoe assembly 10, and prevent the escape of fresh air from inside the ventilation bodies 16, 17. The exhaust ports 23, 24 have similar one-way valves 23A and 24A. The exhaust valves 23A, 24A allow air flow in only one direction outwardly from the ventilation bodies 16, 17 to the interior of the shoe assembly 10.

[0032] Figures 3, 4, 5, and 6 illustrate sequential operation of the shoe assembly 10. As the wearer steps, pressure is generally applied first to the ventilation body 16 under the heel, as shown in Figure 3. The ventilation body 16 compresses causing fresh air to discharge through the exhaust ports 23. The second ventilation body 17 compresses under the weight of the ball and toes of the foot, as shown in Figures 4 and 5. The resulting fresh air discharged through respective exhaust ports 23 and 24 penetrates the

insole and ventilates the interior of the shoe assembly 10. The intake valves 21A, 22A prevent the escape of air from inside the ventilation bodies 16, 17 to the outside of the shoe assembly 10. When the heel is raised, as shown in Figures 5 and 6, fresh air is drawn inwardly from outside of the shoe assembly 10 through the intake 21 as the resilient ventilation body 16 returns to its original expanded form. The exhaust valves 23A prevent passage of air from inside the shoe assembly to the ventilation body 16. When pressure is released from the ball region of the shoe assembly 10, as shown in Figure 6, the second ventilation body 17 returns to its original expanded form in an identical manner. This process is repeated during each step of the wearer, thereby effectively ventilating the foot to keep it comfortable and dry.

[0033] Figure 7 shows a further embodiment of a self-ventilating shoe assembly 30 according to the present invention. Like that described above, the shoe assembly 30 includes an upper 31, an outsole 32 attached to the upper 31, and an insole 34 located between the upper 31 and the outsole 32. First and second resilient ventilation bodies 36 and 37 are located between the outsole 32 and the insole 34, and within respective cutouts formed in a polyurethane midsole (not shown). The ventilation bodies 36, 37 reside in the heel and ball regions of the shoe assembly 30, and include respective tubular air intakes 41 and 42, and a number of strategically arranged air exhaust ports 43 and 44. The tubular intakes 41, 42 extend outwardly from respective ventilation bodies 36, 37 through the midsole to a side wall of the outsole 32. Standard one-way valves 41A and 42A are formed adjacent the mouths of the intakes 41, 42 to regulate and control air flow. The intake valves 41A, 42A allow one-way air flow inwardly from outside of the shoe assembly 30, and prevent the escape of fresh air from inside the ventilation bodies 36, 37. The

exhaust ports 43, 44 have similar one-way valves 43A and 44A. The shoe assembly 30 operates in a manner identical to that previously described.

[0034] Figures 8 and 9 show yet another preferred embodiment of the present shoe assembly. The shoe assembly 50 includes each of the elements of the shoe assembly 10, described above. These common elements are indicated in prime (') notation in the drawings. In addition, the shoe assembly 50 includes a slightly curved, laterally-extending toe vent 51 connected to the second ventilation body 17'. The toe vent 51 has a number of spaced-apart air ports 52 designed to discharge fresh air directly to the toes of the wearer, as shown in Figure 9. A standard ball valve regulates one-way flow of air outwardly from the ventilation body 17' to the interior of the shoe assembly 50. As the ventilation body 17' expands to its original form after compressing under the weight of the wearer, the ball 53 seats within the socket 54 to restrict air passage through the toe vent 51 and into the ventilation body 17'. Instead, fresh air is drawn back into the ventilation 17' through the intake 22'. The remaining elements of the shoe assembly 50 operate in an identical manner to that previously described.

[0035] Figures 10, 11, and 12 illustrate various constructions of a ventilation body applicable for use in the present shoe assemblies 10, 30, and 50. The ventilation body 60, shown in Figure 10, includes bellows 61 which operate to immediately expand the body 60 when the foot is raised. The ventilation body 70, shown in Figure 11, includes bellows 71 and further incorporates a compression spring 72 for added resilience. Figure 12 shows a ventilation body 80 including a porous, visco-elastic foam 81. This "memory foam" 81 offers substantial resilience, and effectively moves fresh air into and out of the ventilation body 80 upon application and removal of pressure, as previously described. The present

invention may incorporate any one or more these ventilation bodies 60, 70, and 80.

[0036] A self-ventilating shoe assembly is described above. Various details of the invention may be changed without departing from its scope. Furthermore, the foregoing description of the preferred embodiment of the invention and best mode for practicing the invention are provided for the purpose of illustration only and not for the purpose of limitation—the invention being defined by the claims.